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PC-BASED MULTIPLE INFORMATION  
SYSTEM INTERFACE (PC/MISI)  
DETAILED DESIGN  
AND  
IMPLEMENTATION PLAN

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ABSTRACT

This document represents the design plan for the personal computer multiple information system interface (PC/MISI) project.

The document is intended to be used as a blueprint for the implementation of the system and each component is described in the detail necessary to allow programmers to implement the system.

A description is included of the system data flow and the system file structures.

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## I. Interactive Subsystem

The Interactive Subsystem is responsible for accepting information from the user and performing appropriate actions depending upon this input. The Subsystem consists of an Access Module, a Search Module and a Local Processing Module.

### 1.1 Overview

#### 1.1.1 System Access Module

The first module of the Interactive Subsystem will be concerned with controlling access to the different capabilities of the system. The user will first see the prompt "Enter User ID:". He will then enter his assigned ID. He will then see the prompt "Enter Password:". PC/MISI will then search for an access record with this name and password. The password will be encrypted so the necessary encryption of the user input will be performed prior to attempts to locate the record. If the record is not found, a message indicating that the security information was not valid will be displayed and the user will be prompted to re-enter his access information (maximum of two re-entries). The interaction will also be written to a security violation file. The access record will also contain a list of the systems to which the user has access. After receiving the correct entry, the user will be allowed to begin the procedures for searching a

system. The interface administrator will be given a choice of performing system administrative functions or entering the search module.

#### 1.1.2 The Search Module

The commands to be implemented in Levels I and II of PC/MISI were chosen based on an analysis of data indicating frequency of usage of system commands on several systems [Borgman, 83; Cooper, 83; NASA, 85]. The commands are:

- 1) Connect to a system
- 2) Disconnect from a system
- 3) Search for a subject
- 4) Search for an author
- 5) Search for an accession number
- 6) Search for a title
- 7) Search for a corporate source
- 8) Display an accession on the screen
- 9) List alphabetically adjacent terms in the index
- 10) List related terms
- 11) Boolean operations AND, OR and ANDNOT
- 12) Change to a new database
- 13) Print system news
- 14) Limit search to those accessions before or after a  
specified date



- 15) Remote print
- 16) Search text
- 17) Set status
- 18) Release all sets
- 19) Sort set

### 1.1.3 Local Processing Module

Additional Commands required to utilize local processing capabilities will also be provided to the user. These are:

- 1) Save accession to local file
- 2) Sort local file
- 3) Merge two local files
- 4) Print on local printer
- 5) Specify local file name to be used for downloading records

### 1.2 Level Definitions

Level I of PC/MISI (menu driven interaction) will incorporate the commands to be used at Level II (command driven interaction) into the menu selection items. The actual command will be highlighted so that it is identifiable to the user and will serve as a training aid for future utilization of the Level II commands. The user will be able to change levels at any time by pressing a function key (F9). This action will bring up the

original level selection menu.

Levels I and II will involve the use of the Command Table specific to the host system to translate PC/MISI commands into values which the Translator will use to generate host system commands. This will be accomplished by linking menu item selections to specific entries in the PC/MISI Command Table (see Table 1) at Level I. The level II translation will involve a comparison of the command (the first word in the command string) with entries in the PC/MISI Command Table to find a match for the command issued and then use the index to the command in this table to generate the appropriate value to be passed to the Translator. The Interactive Subsystem will, in both cases generate an integer value to be passed to the Translator along with the argument(s). This integer value will be used to determine the specific action to be taken by the Translator.

TABLE 1

PC/MISI COMMAND TABLE

1. COS (Connect to system)
2. DIS (Disconnect from system)
3. SED (Select Database)
4. FIS (Find Subject)
5. FIA (Find Author)
6. FIT (Find Title)
7. FIC (Find Corporate Source)
8. LAD (List Adjacent Terms)
9. LIR (List Related Terms)
10. DIA (Display Accession(s))
11. COS (Combine Sets)
12. PRR (Print Remote)
13. SYN (System News)
14. SET (Search Text)
15. FIN (Find Accession Number)
16. LIM (Limit Searches)
17. SES (Display Set Status)
18. REL (Release All Sets)
19. SOR (Sort Set)
20. CHAF (Change Download File)

- 21. SOF (Sort Local File)
- 22. MEF (Merge Local Files)
- 23. PRL (Print File on Local Printer)
- 24. DEF (Delete Download File)
- 25. DIF (Display Records in Local File)
- 26. DER (Delete Record from Local File)

Items number 1-19 will be used as output to the Translator.  
Items 20-26 are strictly for local processing.

### 1.3 Level I: The Menu System

There will be five basic menus utilized at Level I. The Level Menu will allow the user to choose his level of interaction with the system and will be the first displayed to the user upon entering the system. The Process Menu will be displayed next for the user who chooses Level I and will provide the user with basic processing choices. There will be two menus actually used for designing a search. The Primary Search Menu will contain those commands utilized most frequently and the user should be able to conduct most searches of a single data base utilizing this menu only. The Secondary Search Menu will contain those commands used less frequently but nevertheless considered necessary for providing the desired level of search capability.

The user may, at any menu in the system, invoke the next menu in the sequence by simply entering a carriage return when prompted for a menu selection. An entry of 0 will be used for moving backward through the menu system.

#### 1.3.1 Level Selection Menu

The first menu the user will see upon entering the system will be the level selection menu:

**CHOOSE LEVEL:**

- 1) MENU
- 2) COMMAND
- 3) DIRECT SYSTEM ACCESS (STANDARD DOWNLOAD FILES)
- 4) DIRECT SYSTEM ACCESS (LOG FILE)

A choice of any item other than 1 will result in the display of the system prompt ">" and the user input will be accepted at that point (see Sections 1.6 and 1.7).

**1.3.2 Process Menu**

The choice of item 1 from the Level Selection Menu will cause the display of the process menu.

- 1) CREate Batch File
- 2) COnnect to System
- 3) TRansmit Batch File
- 4) LQcal Processing
- 5) DIsconnect from System
- 6) QUit

The selection of the first item will take the user directly to the Primary Search Menu whereas the second will first display a list of systems to which the user has access, allow him to choose one, and send the name of the system access file to the

Translator along with the appropriate command number to be processed and sent to the communications system for performing of the necessary connection functions, and then return to the Process Menu. The user may then select item 3 in which case the user will be prompted for the name of a batch file to be transmitted. If a file has been created in the current session, this will be the default file and can be transmitted by simply hitting the return key. Previously created files can be selected by name. A list of available batch files can be displayed by entering "list" when prompted for the name of a batch file (in order to implement this, it will be necessary to utilize a standard suffix for batch files). This list should be printed in a window which does not overlap the menu and the standard suffix should not be displayed. An entry of 0 will abort this process and return the user to the Process Menu.

### 1.3.3 Primary Search Menu

The user selecting item number 1 from the process menu will receive the Primary Search Menu:

- 1) SElect Database
- 2) FIind Subject
- 3) FIind Author
- 4) FIind Title
- 5) FIind Corporate Source

- 6) List ADjacent Terms
- 7) List RELated Terms
- 8) DISplay Accession(s)
- 9) COMbine Sets

Selection of any of these items will result in the display of the standard system prompt and the user will be required to enter a single argument for the specific command. The argument for item number 1 must be compared to the contents of <System Name>.DBs. If the argument is not found in this file, the last character of <System Name> must be examined to determine if it is an integer. If so, a search must be made of all other files with the same root system name and different integers appended. If a match is found, then the corresponding <System Name> Interpreter Files and System Command Tables must be loaded before continuing. If the data base descriptor is not located, an error message must be sent to the user and a new menu item selected. The argument for item number 8 will consist of a set number and the location of the specific item within the set in the form SS/NN. NN may, in fact, be the string "ALL" to display the entire set. In the case of the combine statement, the argument will consist of a series of set numbers connected by Boolean operators.

#### 1.3.4 Secondary Search Menu



The secondary search menu will contain less frequently used commands:

- 1) PRint rEmote
- 2) SYstem News
- 3) CHange File
- 4) SEarch Text
- 5) FInd Number
- 6) LIMit Searches
- 7) SEt Status
- 8) RELease All Sets
- 9) SORt set

Item number 1 will take a set number as an argument and will issue a request to the host system to print the indicated set and send it to the user. Item number 2 will take no arguments and will display the news segment of the host system. Item 3 will take one argument and will allow the user to close the current download file and open a new file with the name of the user-supplied argument. Items 4 and 5 will be handled identically to items in the Primary Search Menu (a prompt will be displayed and a single argument will be accepted). Item 6 will cause a prompt to be displayed and the user will enter a "b" or "a" to indicate before or after respectively and then the desired

cutoff date in the form mmddyy. Entering a 0 will cause any current limitations to be removed. Item number 7 will cause a list of currently available sets to be displayed. This display will include a set number, the size of the set and the PC/MISI command which resulted in the creation of the set. Item number 8 will result in the clearing of all current sets. Item number 9 will take a single set number as an argument and one of the PC/MISI addressable fields as the sort argument.

#### 1.3.5 Saving Accessions

The user can save the previously displayed accession by pressing function key F1. He can also save an entire set by pressing function key F2. This second option will generate a prompt for the set number. After the user inputs the set number, PC/MISI should generate an estimate of the time required to download the entire set. This will require an examination of the size of the set and an estimation based on a time factor which should be generated by keeping a running average of all accessions downloaded. The estimated time should be displayed in the user orientation window at the bottom of the screen. The total number of accessions in the set and the total currently downloaded should also be displayed in this area. The user can terminate the downloading of a set at any time by pressing function key F3. The downloading will then stop after retrieving

the current accession. This process will be implemented by looping through a code segment which first sends a command to display the first element of the set and then sends subsequent display commands with a "+" as an argument to continue the process (see Translator Subsystem Description Section 2.2).

The two search menus will always be displayed in the upper half of the screen and the results returned from the host system will be displayed in the lower half. In batch mode, the sets created by the user will be listed in the lower half. The set description will include a set number and the PC/MISI command which will be used to create the set

#### 1.3.6 Batch Processing

A user in batch mode will return to the Process Menu when he has completed formulating his search and select menu item 3 to initiate connection. PC/MISI will then connect to the system and return the user to the Process Menu. The user may then select to transmit the batch job as previously described. During this process, the PC/MISI commands will be displayed in the upper half of the screen and the results will be displayed in the lower half. If an error message or an unidentifiable response is returned by the system, PC/MISI will cease processing the file and query the user to respond affirmatively if he wishes to continue. If the user responds affirmatively and the command

which causes the error would have resulted in the creation of a set, PC/MISI will examine the remainder of the batch file for a Boolean command which references the set. If one is found, PC/MISI should inform the user that this will create another error and ask for a revised argument to the boolean command or an elimination of the Boolean command (indicated by a response of 'd'). If the user responds that he does not wish to continue, he will be given the choice of substituting a new command for the erroneous one or terminating the batch job. If he chooses to terminate the batch job, he should be asked if he wishes to clear all current sets.

After the successful completion of a batch job, the user will be asked if he wishes to save the batch file. If so, he will be prompted to enter a name for the file. After completion of either the batch job or error processing, the user will be returned to the Process Menu.

### 1.3.7 Local Processing

The selection of menu item 3 from the Process Menu will result in the display of the following menu (Local Menu):

1. Change File
2. Sort File
3. Merge File
4. Print Local File

5. DElete File
6. DIsplay Record
7. DElete Record

Menu item 1 is identical to the change file command in the secondary search menu and is used to choose the current file for processing. If a file is currently in use, PC/MISI will assume that all references are to this file unless this command is used to change it. If no file is currently active, the user must use this command to select one before utilizing any of the other commands. The second menu item will sort the currently active file on a field chosen by the user. After selecting this item, the user will be presented with the following list of fields from which to choose his sort field:

1. AUthor
2. TItle
3. Accession Numer
4. Corporate Source
5. Publication Date
6. SUbject

All accessions which have an empty sort field will be placed at the end of the file. Any accessions with identical fields will be placed in the sorted file in the order in which they are

encountered. A subject sort will utilize the first term encountered. After the user selects a field, the system will perform the requested function and return to the previous menu.

The third menu item will result in the display of the name of the currently active file and then prompt the user for the names of the other files to be merged with the current one. The user may display a listing of all accession files to which he has access by entering the string "list" or "ls" at this point. (Note: This will require that all download files have a standard suffix attached when they are created. The user should not, however, be required to enter this suffix when requesting access to his files). After the list of files is produced, the user will be prompted once more to enter the names of files to be merged. These should be entered on separate lines and a "0" entered to indicate that the list is complete. The system will then ask for the name of the new file. If the user enters the name of an already existing file other than the current one, he should be advised that the file will be overwritten. After the concatenation of the files is complete, the user should be asked if he wishes to delete the old files and appropriate action taken depending upon the response.

Selection of menu item number 4 will result in the local printing of the currently active file. Item number 5 will delete the currently active file after asking the user if he is sure he

wants it deleted. Item number 6 will display the first record of the currently active file after clearing the screen. If the entire record cannot be displayed in the available screen area, the user will see the prompt "more?" on the last line and the remainder (or the next screen) of the accession will be displayed if a "y" is entered; else the standard prompt ">" will appear and the user will enter a "+" to see the next accession, an integer indicating the specific record he wishes to see or an "0" to return to the menu.

Selection of item number 7 will result in the deletion of the previously displayed record. The user should be given a chance to reconsider before this action is taken. The user will not be allowed to delete an accession without first displaying it.

#### 1.4 Level II: Command Language

A user operating at Level II will use a command language identified by highlighted letters in the previously described menus. The command itself will always be a single sequence of letters entered as the first "word" of the command string. The argument(s) of the command will follow this string on a single line and will have the same characteristics as those described for Level I. The command word must be compared to the PC/MISI Command Table (Table 1) which will be used to identify the

integer value to be passed to the Translator. The system must also determine if the number of arguments is correct before invoking the Translator and perform the necessary interaction with the user to generate the correct number of arguments if this is necessary.

### 1.5 Level III: Direct System Access

A user who wishes to function at Level III will be able to choose whether he wants the capability of simply downloading a log of his interaction with the host system (Level Menu option 3) or downloading accessions into the standard PC/MISI file format (Level Menu option 4). The selection of this latter option will require that PC/MISI transmit the request for the standard format to the host system as in the other two levels but will also require the Translator to examine the user's commands and alter display commands to use this format. The user will not be allowed to transmit a format command if he selects this option. (This will be enforced by the Translator). The user can use function keys as described in Level I to open and close files and to begin and end saving of downloaded information in either mode.

### 1.6 System Response

After sending the appropriate parameters to the Translator, the Interactive System will wait until the Translator and



Interpreter have completed their functions. The Interactive System will then read the Inter.out file generated by the Interpreter. The first item in this file will be an integer which will be 0 if the system response was not a recognizable error message. If an error message was detected, the Subsystem will display the message with a red background to ensure the user's attention. If the command originally sent to the Translator was a search term and an error is not returned, the Interactive Subsystem will read the next item in the Inter.out file which will be the number of accessions retrieved and the following item which will be the host system set number. These values will be stored in an association with the PC/MISI set number for later use, and the PC/MISI set number, the number of accessions and the PC/MISI command which generated the search will be displayed to the user. If the number of accessions retrieved was 0, the Interactive Subsystem will read the next entry in the file. If this entry is an "R", the system has the capability of displaying related terms and the user should be asked if he wants to see a list of these terms. If the user indicates that he wishes to see this list, the appropriate command should be sent to the Translator. Otherwise the contents of the file will be displayed normally in the area of the user display dedicated to this purpose. The lines of the file should be displayed until they fill the designated area with one

line left for the prompt "more?" indicating that the file display has not been completed. The user should have the option of displaying the remainder of the file or returning to the state he was in when he initiated the communication to the host system. The user should also have the capability of scrolling backward or forward through the file as he desires.

### 1.7 Error Processing

The Interactive Subsystem must be able to deal with any error generated by the user of the system and must also be able to do some processing related to errors returned from the host system.

The Interpreter will print an integer into the Inter.out file as previously described. If this integer is a 1, it indicates that the requested search term was not in the dictionary of the host system or that zero accessions were returned. The Interactive Subsystem should then read the next entry in the file. This entry will either be a "X", "R", "XR", or "0". These entries indicate, respectively, that the host system has the capability of displaying terms alphabetically adjacent to the term in question, that the host system has the capability of displaying terms related to the term in question, that both capabilities are present, or that neither capability is present. If any but the last case is true, the Interactive Subsystem

should first display the text in the remainder of the response file and then ask the user if he wishes to see such a display (giving him a choice if both capabilities are present) and, if the answer is affirmative, should send the appropriate command to the Translator along with the search term originally input by the user. If neither option is available, the Interactive Subsystem will simply print the error message and return the user to the search menu. In cases of other error messages, the Interactive Subsystem will simply print the contents of the Inter.out file in the designated area and with a red background.

The Interactive Subsystem should be able to handle any action which the user may take in response to a PC/MISI prompt. The system should in no case terminate abnormally. Invalid input should be answered by a message indicating that the number is out of range, if in the menu system, or that the user has entered an unrecognizable command, if in the command system. The user at the command level should be given an option of displaying all existing commands or switching to the menu system. If a user at command level enters the wrong number of arguments for a PC/MISI command, he should be informed of the correct number and type of arguments. Arguments of the wrong type should result in similar messages. A user who attempts to execute a non-existent batch file or print a non-existent file should be given the option of reentering the command or displaying a list of files in the

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appropriate category. A user who requests creation of a file which already exists should be informed of this and allowed to back out of the request if so desired.

## II. THE TRANSLATOR SUBSYSTEM

This subsystem is responsible for the translation of a PC/MISI command into a format acceptable to the host system. This will be accomplished through the use of a system specific command table (SCT) described in Table 2.

### 2.1 Parameters

The following information will be passed to the Translator from the Interactive Subsystem:

1: Level Indication

0 - Level I or II

1 - Direct System Mode (Text File)

2 - Direct System Mode (PC/MISI File)

2: PC/MISI Command Number

3: List of Arguments (0-4) separated by commas

(3 commas must always be present in order to ensure uniformity and to let the translation subsystem know that the argument list is complete)

If the Level Indication is '1', no action will be taken and the command will be passed to the communications subsystem as received. A Level Indication of '2' will require a comparison

with SCT 24 to determine if a format command is issued. If so an error message will be returned to the user by placing a "-1" in the Inter.out file along with an error message indicating that this operation is not allowed at level 2 and that the user should shift to level 1 if he wishes to display different information than the standard PC/MISI fields and no command will be passed to the communications system. If the requested action is not a format command, a second comparison will be made to SCT 10 to determine if a display command has been issued and, if so, the user defined format indication will be forced into the user command. If neither of these conditions is true, the command will be passed to the communications subsystem as received.

TABLE 2

SYSTEM COMMAND TABLE DESCRIPTION

1. Logoff
2. Combine sets XXX (Boolean Expression)
3. Use Database XXX
4. Create set containing all references to subject XXX
5. Create set containing all references with author XXX
6. Retrieve Accession with title XXX
7. Create set containing all references to corporation XXX
8. Display List of all terms alphabetically adjacent to XXX
9. Display list of all terms related to XXX
10. Display accession located in set SSS, location XXX, in  
user defined format.
11. Print System News Segment
12. Terminate System News Display
13. Request Print at remote site of set SSS, location XXX
14. Search for term XXX in text of accessions in set SSS
15. Display accession number XXX
16. Limit set number SSS to items dated BEFORE mmddyy<yy>
17. Limit set number SSS to items dated AFTER mmddyy<yy>
18. Month Descriptor (0=alpha; 1=numeric)
19. Limit utilization type

(0 = command to be ANDED to search expression;  
1 = command to be used alone)

20. Release Limit
21. Display set status
22. Release all sets
23. Sort set SSS on Field FFF
24. Establish user defined format to display only  
PC/MISI-required fields
25. Display remainder of item which could not fit on one  
screen
26. Display entire set SSS
27. Display next item in current set
28. Boolean AND
29. Boolean OR
30. Boolean ANDNOT
31. Answer to system query 1
32. Answer to system query 2
33. Answer to system query 3

This table will contain system specific commands to perform the indicated functions with the variables (XXX,SSS,FFF,mm,dd,yy<yy>) in the proper position within the command string. The translator will replace these variables with values passed to it by the Interactive subsystem.



## 2.2 Translation

The actual translation of PC/MISI commands will occur when a Level Indicator of '0' is received. The selection of specific translation activity will be driven by the second argument received by the Translator (the PC/MISI command number). The necessary actions associated with each of these commands is described in the following sections:

- 1: Connect to the host system - the argument supplied with this command will be the name of the file which contains the necessary information to make the connection to the host system. The Translator will open this file, read the contents, write the contents into the Trans.out file after first writing a '1' into the file to indicate that this is a system connect request.
- 2: Extract SCT 31 and send to Communicator
- 3-9: Search Expressions - Extract SCT [i-2], replace the dummy value XXX with the argument and pass result to Communicator with a preceding '0'.
- 10: Display accession - The Translator will first examine arg2 and if arg2 is '+', the Translator will send SCT 27 to Communicator. If arg2 is not '+', the Translator will extract SCT 10, replace SS with arg1 and XXX with arg2

and send the resultant string to Communicator.

- 11: Extract SCT 2 and replace XXX with argument and send to Communicator.
- 12: Extract SCT 12 and replace SSS with arg1 and XXX with arg2 and send to Communicator.
- 13: Extract SCT 13 and send to Communicator
- 14: Extract SCT 14, replace XXX with arg1, SSS with arg2 and send to Communicator
- 15: Extract SCT 15, replace XXX with arg1 and send to Communicator
- 16: LIMIT - The arguments to this command will be:
  1. Command Type (0 = Limit All Subsequent Searches  
                  >0 = Limit Particular Set)
  2. Limit Type (0 = Before arg3; 1 = After arg3)
  3. Date (in the form mmddyy where mm,dd and yy are integers)

The Translator will check if mm and dd are in the proper range and, if not, return an error message to the Interactive Subsystem. If they are valid, the Translator will extract SCT 18 which will contain a 0 if the month is to be transmitted as alpha and a '1' if numeric. If '0', the Translator will modify mm appropriately. SCT 16 will then be extracted (if arg1 = 0 or SCT 17 if arg1 =

1) and mm and dd will be substituted for the strings 'mm' and 'dd' in SCT 16 (or 17). If the third dummy value is 'yy', then yy will be directly substituted for it or, if it is 'yyyy', '19' will be concatenated with yy before the substitution. If arg2 = 0, then 'SSS' will be removed from the command string or else 'SSS' will be replaced with arg4. The command string will then be sent to the Communicator.

17: Extract SCT 21 and send to Communicator

18: Extract SCT 22 and send to Communicator

19: Extract SCT 23, replace XXX by arg1 and FF by arg2 and send to Communicator.

20: Extract SCT 23, replace XXX by arg1 and FF by arg2 and send to Communicator.

21: Extract SCT 26, replace SS with arg1 and send to Communicator

### III. THE INTERPRETER SUBSYSTEM

The Interpreter will perform a variety of functions related to the determination of the nature of the host system response and the formatting of this response for display to the user. The Interpreter will utilize data from the Translator to determine the type of the command sent to the host to determine the expected response. The actual response will be read from a file created by the Communicator.

The responses expected by the Interpreter may be divided into the following categories:

- 1) Error Messages
- 2) Set Construction Data
- 3) Accessions

#### 3.1 Errors

The first action the Interpreter takes in all cases is to examine the first line of the buffer and compare with the error messages in the Interpreter Table. The Interpreter will be able to identify 5 standard error messages and will use this information to generate additional messages for the user as appropriate. The Interpreter will also identify other error messages if the system has a standard format for the error

messages. If an error is not one of the five identifiable ones, the Interpreter will simply place the text of the message in the Inter.out file along with a value of -1 indicating that an error has occurred. The five identifiable errors are found in Interpreter Table positions 3 - 7 and the supplemental text to be displayed to the user will be contained in an array of character strings which will be retrieved from an external file. These supplemental error messages should contain information helpful to the user in determining the source of the error:

#### Supplemental Messages

1. Search Term is not in dictionary of host system. The Interpreter should then check SCT 8 and SCT 9 to determine if expansion or related term capabilities exist on the host system and place the appropriate values in the Inter.out file (see Section 1.6).
2. Invalid command. Put the following message in the Inter.out file "PC/MISI generated the following host system command in response to your request:", command. "This command was not recognized by the host system. Please note this information and inform your system administrator of the problem."
3. Bad User ID. Message "The user id being used for this system is no longer valid. Please inform your system

administrator."

4. Bad Password. Message "The password being used for this system is no longer valid. Please inform your system administrator."

5. System is down. Message "Host System is currently not available".

### 3.2 Set Construction Data

If the Translator has sent a search request to the host system, the Interpreter will be expecting a standard response as indicated by Interpreter Table Entry 9. If this information is received, the Interpreter will place a 0 in the Inter.out file to indicate a successful set retrieval and then place the value of the number of retrievals and the host system set number in the file for return to the Interactive Subsystem. If the number of retrievals is 0, the interpreter will check SCT 9 to determine if the host system has the capability of listing terms related to a specific term. If so, the Interpreter will place an "R" in the file, else a "0" should be written.

If the standard response is not received, the Interpreter should follow the appropriate error-handling steps (See Section 3.1).

### 3.3 Downloading Accessions

An Accession is expected whenever a display command is issued. The interpreter, when expecting an accession, should first examine the last entry in the Inter.out file to determine if the display is complete. Interpreter Table entry 1 indicates completion, entry 8 indicates non-completion. If the downloading is not complete, the Communicator should be activated with the appropriate command to complete the process. This should continue until the complete accession has been processed. The interpreter will then begin the examination of the downloaded accession to determine the contents of each expected field. This examination will involve the examination of the first word of each line until the interpreter finds a match for one of the labels in Interpreter Table locations 11-22. All lines prior to the first identifiable label will be placed in the "miscellaneous" data storage area of the PC/MISI record structure (see Table 4). All information retrieved which is between two identifiable labels will be placed in the file structure location appropriate for the first label. After the completion of processing, the record will be placed in a file buffer and the information will be formatted appropriately for display to the user and placed in the Inter.out file.

Table 3

INTERPRETER TABLE

1. System Prompt
2. Error Message Standard Label
3. Error Message Indicating That the Specified Search Term  
is not in the Dictionary
4. Error Message Indicating Invalidly Formed Request
5. Error Message Indicating Invalid User ID
6. Error Message Indicating Invalid Password
7. Message Indicating That System is Down
8. Indicator That There is More of an Accession to be  
Displayed
9. Response to Set Construction: xxx = set number; yyy =  
number of retrievals; zzz = retrieval request string
10. Set Status Table Header
11. Accession Number Label
12. Issue Number Label
13. Contract Number Label
14. Publication Name Label
15. Title Label
16. Author Label
17. Corporate Source Label



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N A S A

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N A S A

18. Subject Terms Label

19. Abstract Label

20. Unused

4

Table 4  
 DOWNLOAD FILE DESCRIPTION

Description	Field	Size
Accession Number		8
Title		50
Author		52
Date		8
Publication Title		50
Corporate Source		10
Contract Number		30
Subject Terms		10 x 42
Abstract		80 x n

All values will be stored as character data except the date which should be stored as an integer representing the number of days since a standard baseline date. The number of lines in an abstract should be flexible and the system should be able to handle any size abstract.

Table 5

FUNCTION KEY DESCRIPTIONS

KEY #	FUNCTION	MENU LEVEL
F1	Save Previously Displayed Accession	Primary and Secondary Search
F2	Save Entire Set	Primary and Secondary Search
F3	Terminate Downloading of Set	Primary and Secondary Search
F9	Change Interaction Level	All (Returns to Level Selection Menu)

Table 6

SYSTEM FILE DESCRIPTIONS

FILE NAME	FUNCTION
<System Name>.DB	Contains valid databases for current SCT
<System Name>.host	Contains access sequence for <System Name>
<System Name>.SCT	Contains SCT for <System Name>
<System Name>.IT	Contains IT for <System Name>
Trans.in	Communication from Interface to Translator
Trans.out	Communication from Translator to Interpreter
Inter.in	Communication from Communicator to Interpreter
Inter.out	Communication from Interpreter to Interface

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N A S A

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N A S A

ParamN.out

Communications Parameters

(N is a variable value)

17

#### IV. COMMUNICATIONS SUBSYSTEM

The communications subsystem will perform the following functions:

1. Read the access information from a file and interact with the modem, the communications carrier and the host system to put the user into contact with the host system.
2. Inform the user that contact has been established.
3. Read system commands from a file generated from the main program and transmit the command to the host system.
4. Receive lines from the host system and place these lines into a file.
5. Return control to the main program when host system transmission is complete.

##### 4.1 Parameters

The Communicator will read the first entry in the Trans.out file and determine the type of action to be performed based on this value. Actions will be as follows:

- '0' : Transmit Remaining Contents of File
- '1' : Make Connection to Host
- '2' : Complete Download of Accession
- '3' : Testing of System Command Table
- '4' : Disconnect from Host

##### 4.2 Command Transmission

A '0' will indicate that the remaining contents of the file will be transmitted to the host system. This will be used for the

transmission of individual commands to the host. The Communicator will then wait for the host system response and place the contents of the response in the Inter.in file. The Communicator will determine if the host system transmission is complete based upon the fact that no input has been received in a specified time interval.

#### 4.3 Host System Connection

A '1' as the first entry in the file will indicate that the user desires to make a connection to the host system. The second value in the file will be an integer indicating the number of the communication parameter file to use (ParamN.dat will be used where N is the value read from this file). The Communicator will then extract the values from this file and set the parameters accordingly. The third value in the file will be the message indicating that the host system is not currently functioning. The Communicator should extract and store this value. The Communicator will then extract remaining values from the file in pairs with the first member of the pair being the command to send to the host and the second, the expected host response. If the second value is '0', the Communicator will extract and send another command without waiting for the host to respond. If the returned value does not match the expected response, the Communicator should check it against the 'host system down'

message. If it does not match this either, the Communicator should write the command sent, the expected response, and the actual response into the administrative error file and attempt to continue the transmission. If three consecutive non-recognizable responses are received, the Communicator should put the value '-1' in the Inter.in file and terminate.

#### 4.4 Download Completion

If the first value in the Trans.out file is a '2', this indicates that an incomplete accession has been downloaded. The Communicator should then transmit the command found in the remainder of the file to the host system but should append the response to the existing Inter.in file rather than cleaning it out and starting over as in the other two situations.

#### 4.5 Testing

If the first value in the Trans.out file is a '3', this indicates that the Communicator has been called from the Administrative Subsystem to perform testing of a newly-created System Command Table. The Communicator should transmit the remainder of the file to the host system and write the response into the Inter.out file.



#### 4.6 Disconnection from Host System

If the first value in the Trans.out file is a '4', this indicates that the user wishes to disconnect from the host system. The Communicator should transmit the following string to the host system to make the disconnection at that level and then signal the modem that transmission is complete and close the communications port.

## V. ADMINISTRATIVE SUBSYSTEM

The Administrative Subsystem will provide all of the functionality required to add new systems to PC/MISI, modify existing systems, modify communications parameters, create or modify system security files. The main menu of the system will be:

- 1) Add New System
- 2) Modify Existing System
- 3) System Access Control
- 4) QUIT

The functionality related to each of these systems will be described in the following sections. System prompts to be displayed are indicated by a '?' in the leftmost column and values to be accepted in the system tables are indicated by a statement of the form 'Accept TN-N' where TN is PCT to indicate the PC/MISI Command Table, SCT to indicate the System Command Table and IT to indicate the Interpreter Table, and N is the table number where the value, is to be stored. After accepting each value, the user should be asked if it is correct and given a chance to revise it if so desired. A zero will be entered if the function does not exist on this specific system.

## 5.1 Adding a New System

### 5.1.1 Generating the System Command Table

?SYSTEM NAME:

Accept System Name (Maximum Size 8 Characters)

Display Contents and Numbers of Communication Parameter Files  
 (ParamN.dat)

?Choose the Number of the Parameter Set for this Host:

? (Enter the Next Higher Number to Create a New Parameter  
 File)

Accept N

If N > Highest File Number

Create ParamN.dat and prompt user for contents in the  
 following order:

- 1) Baud Rate
- 2) Parity
- 3) Stop Bits
- 4) Word Size

?Enter the Sequence of Commands Necessary to Arrive at the  
 State in Which the Host System Will be Waiting for the User  
 to Select a Specific Data Base. This Must Include the  
 Originating Phone Number. Each Command Should be Followed by

the Expected Response or a '0' if No Response is Expected:

Accept Contents of File <SystemName>.host

?Enter Names of System Data Bases Which Use the Same Commands:

Accept Remainder of File <System Name>.DBs

**\*\*Note:** In Systems which have different command sets for different data bases, it will be necessary to enter a separate set of commands for each set of data bases (or each data base). These should be referred as SystemNameN where N indicates a unique identifier for that set of data bases.

?Enter Logoff Command:

Accept SCT-1

?Enter Data Base Selection Command:

Accept SCT-3

?Enter Response(s) Expected When Changing Data Bases

?(Maximum of 3, Enter '0' When Complete)

Accept SCT-31, {SCT-32}, {SCT-33}

?Enter Standard System Prompt:

?Enter Command to Combine Sets:

?(Enter XXX where Boolean Expression Would Be Placed)

Accept SCT-2

?Enter Command to Retrieve All References to Subject XXX:

Accept SCT-4

?Enter Command to Retrieve All References to Author XXX:

Accept SCT-5

?Enter Command to Retrieve Accession with Title XXX:

Accept SCT-6

?Enter Command to Retrieve All References to Corporate Source  
XXX:

Accept SCT-7

?Enter Command to Display List of All Terms Alphabetically  
Adjacent to Term XXX:

ACCEPT SCT-8

?Enter Command to Display List of All Terms Related to Term XXX:

ACCEPT SCT-9

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N A S A

?Enter Command to Display Accession Located in Set SS, Location  
XX:

Accept SCT-10

?Enter Command to Display System News:

Accept SCT-11

?Enter Command to Terminate System News Display:

Accept SCT-12

?Enter Command to Request Remote Site Print of set SS, location  
XX

Accept SCT-13

?Enter Command to Search for Term XXX in Text of Accessions in  
Set SS:

Accept SCT-14

?Enter Command to Display Accession Number XXX:

Accept SCT-15

?Enter Command to Limit Set Number SS to Accessions Dated BEFORE  
mmddyy<yy> (Four Digit Year Should be Entered Only if  
Necessary):

**Accept SCT-16**

?Enter Command to Limit Set Number SS to Accessions Dated AFTER  
mmddyy<yy> (Four Digit Year Should be Entered Only if  
Necessary):

?Enter '0' if Month is to Be Entered As a Character String or '1'  
if it Will Be Entered as a Number:

**Accept SCT-18**

?Enter '0' if Limit Command is to be ANDED to Individual Search  
Expressions or a '1' if the Command is Utilized Alone:

**Accept SCT-19**

?Enter Command to Clear Previously Entered Limit Request:

**Accept SCT-20**

?Enter Command to Display the Current Status of All Sets  
Generated in This Session:

**Accept SCT-21**

?Enter Command to Release All Current Sets:

**Accept SCT-22**

?Enter Command to Sort Set SS on Field FFF

Accept SCT-23

?Enter Command to Specify that All Accession are to be Displayed  
in the Following Format:

Accession Number

Author

Title

Publication Date

Place of Publication

Corporate Source

Contract Number

Subject Terms

Abstract

(If This System Does Not Allow This Degree of Flexibility,  
Enter the System Format Command Which is Closest to This  
Format or Enter Zero to Use the Default System Format).

Enter:

Accept SCT-24

?Enter Command to Display the Remainder of An Accession Which  
Would not Fit on One Screen:



Accept SCT-25

?Enter Command to Display Entire Set SS

Accept SCT-26

?Enter Command to Display Next Item in Current Set

Accept SCT-27

?Enter BOOLEAN AND Expression:

Accept SCT-28

?Enter BOOLEAN OR Expression:

Accept SCT-29

?Enter BOOLEAN ANDNOT Expression:

Accept SCT-30

?Does This System Ask For Information From the User When a Data  
Base Change Occurs:

Accept Boolean Response

If True

?Enter Desired Response(s) (Max 3):

(Enter '0' When Finished)

Accept SCT-31,<32>,<33>

Else Place zeroes in SCT 31,32,33

?The Host System Command Table is Now Complete. If You Are  
Satisfied That All Commands Are Correct, Enter 'Y'; Else  
Enter 'N' to Make Corrections:

Accept Response

If Response = 'N'

Perform modification activities as described in Section 5.4.

If Response = 'Y'

?Are You Ready to Connect to Host System to Test Entries?:

Accept Response

If Response = 'N'

?System Command Table Will Be Saved in a Temporary File  
to be Tested and Completed in the Future. You MUST  
Return to the Administrative Subsystem to Complete the  
System Entry Before Attempting to Access this System  
Through the Interface Subsystem.

Save System Command Table in <System Name>.SCT.temp

**Return to Main Menu of Administrative Subsystem**

**If Response = 'Y'**

**?Enter Carriage Return When Modem is Connected and Ready:**

**Write Contents of <System Name>.connect.temp into  
communicator input file preceded by a '1' and activate  
communicator.**

**Check Contents of Inter.out File**

**If '-1' (Error Has Occurred)**

**Display Contents of Inter.out File**

**Display Contents of Host System Access File**

**These should be displayed in side-by-side windows on the  
screen and the user should be able to scroll both windows.  
Each Entry in the Access File should have a number placed  
next to it.**

**?Access File Entry to Change:**

**Accept Number**

**Accept new file entry corresponding to number**

**?More Changes:**

**If 'N'**

**Attempt access again**

**If 'Y'**

**Accept Number**

Repeat entire process until access is successful

The process of checking each SCT entry and generating IT entries will now begin. After each transmission to the host, the system should display the contents of the Inter.out file and ask the user if the command was correct. If a negative response is received, the user should be allowed to change the appropriate table entry and the process should be repeated until the user indicates that he wishes to go on to the next command. If an entry of 0 is found in the required SCT location, the activity associated with that specific entry should be skipped.

?Enter the Name of the Data Base You Wish to Use for Testing:

Accept XXX and Generate System Command Using SCT-3

Place Command in Trans.out file preceded by a '3' and activate Communicator

?Enter a Subject Term Which You Expect to Find in This Data Base:

Accept XXX and Generate System Command Using SCT-4

Place Command in Trans.out file preceded by a '3' and activate Communicator.

Perform similar processing for SCT entries 5-9.

?Enter Set Number and Location Within the Set for a Valid  
Accession:

Accept SSS and XXX and generate command using SCT-10.

Place SCT-24 in Trans.out file followed by Generated  
Command.

Place command 11 in Trans.out file and activate the  
Communicator.

Place SCT-12 in Trans.out and activate Communicator

Use SSS and XXX previously entered, generate command using  
SCT-13, place in Trans.out and Activate the Communicator.

?Enter Set Number and a String You Expect to Find in That Set.

Accept SSS and XXX and Generate Command Using SCT-14.

Place Command in Trans.out file preceded by a '3' and  
activate Communicator.

?Enter a Valid Accession Number:

Accept XXX and generate command using SCT-15

?Enter a Date in the Past In the Form Expected by the System

Accept mmddyy<yy>, generate command using SCT-16 and SCT-19

Use same values with SCT-17.

Place SCT-20 in Trans.out file and activate Communicator

?Testing Set Status Command

Place SCT-21 in Trans.out file and activate Communicator

?Enter Set Number and Field Id for Sorting of That Set:

Accept SSS and FFF, generate command using SCT-23

Place command in Trans.out file preceded by a '3'

?Testing Entire Set Display

?Note: If the First Accession is Longer than the Page Length  
 of ?the System Display Only the First accession Will be  
 Displayed. ?Next Command Will Display the Following Page.

Use SS from previous command, generate command using SCT-26

Place command in Trans.out file preceded by a '3'

?Testing Set Release

Place SCT-22 in Trans.out file preceded by a '3'

#### 5.1.1.2 Generating Interpreter File

The process of generating the Interpreter involves a combination of generation of system messages by PC/MISI and interaction with the user to determine if the proper message has been generated and to identify the location of certain fields critical to the construction of the table. After each attempt by PC/MISI to generate a specific message, the user should be asked if the message is correct. If so, the message should be stored in the appropriate table location. If not, the user should be asked to input a command which he believes will generate the appropriate message.       →

?Do You Have a Light Pen and Want to Use it For Identifying Information Displayed on the Screen.

Accept Response

If Response = 'Y'

Set appropriate flags

?You Will Be Asked to Identify Various Fields During this Process. When Prompted, Place the Light Pen in the Proper Position and Activate.

Else

?When Prompted to Identify a Particular Field, Place the Cursor at the Beginning of the Field, Press F8, Move the Cursor to the End of the Field and Press





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N A S A

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N A S A

Entered:

Accept IT-5

?Enter System Message Indicating that an Invalid User Password  
has Been Entered:

Accept IT-6

?Enter Message to be Returned when the Host System is not  
Available:

Accept IT-7

?Enter the System Prompt Indicating that there is More of an  
Accession to be Displayed:

Accept IT-8

?Enter a Subject Term Which You Expect to Find in this Data Base:

Accept XXX

Generate command using SCT-4.

Place in Trans.out preceded by a '3'.

Activate Communicator

Display contents of Inter.out

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N A S A

-----  
N A S A

?Point to the Beginning and Then the End of the Set Number Field:

Accept Position of xxx

?Point to the Beginning and the End of the Field Identifying the  
Number of Accessions Retrieved:

Accept Position of yyy

?Point to the Beginning and the End of the Set Description Field:

Accept Position of zzz

Build IT-9

Place SCT-21 in Trans.out preceded by a '3'

Activate Communicator

?Point to the Beginning and the End of the Set Status Table  
Header

Accept the positions of the beginning and end of this string  
and place the string in IT-10.

Generate Command to Display First Accession in Current Set

Display series of prompts asking the user to point to the  
labels of the various required fields.

Accept IT entries 11-19. If <System Name>.host.temp was  
used

Delete it

Write <System Name>.host

Write <System Name>.SCT

Write <System Name>.IT

## 5.2 Modify Existing Systems

This subsystem will be used to change the System Command  
Table, the Interpreter Table or the Access Procedures for a  
particular system. The functions will operate as follows:

?Enter System Name:

Accept <System Name>

?Choose one to Modify:

1. System Command Table
2. Interpreter Table
3. Access Procedures

Retrieve appropriate values

if SCT or IT

?Enter Entry Number to Change:

Display Current Value, Accept New Value and Store.

**If Access Procedures**

Display each line of file and number each line

?Number to Change:

Accept Number

?New Value:

Accept new value

If new value = 0, delete old value;

else place in appropriate location, and redisplay  
entire file.

If Number = 0,

Store new contents of file and exit.

### 5.3 System Access Control

This procedure will be used to add individuals to the access control list.

?Enter User Name:

Accept UserId

?Enter User Password:

Accept input and encrypt for file storage

?Enter Systems:

Accept next system until user enters 'q'.

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